IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Khamir Girish Joshi et al.	§	**Examiner:**	Sunil Singh
Serial Number: 10/711,487	§	**Group Art Unit:**	3672
Filed: September 21, 2004	§	**Attorney Docket No:**	04-11
For: Distributed Buoyancy Subsea Pipeline Apparatus and Method	§	**Confirmation No.:**	5486

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF SUBMITTED UNDER 37 C.F.R. § 41.37

Applicant submits this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the Final decision of the examiner of Group Art Unit 3672 dated March 3, 2010, twice rejecting claims 58-62, 64, 65, and 73-85.

TABLE OF CONTENTS

I. Real Party in Interest

The real party in interest is Kellogg Brown & Root LLC, a limited liability company.

II. Related Appeals and Interferences

Applicant asserts that no other prior or pending appeals, interferences, or judicial proceedings are known to the Applicant, the Applicant's legal representative, or assignee which may be related to, directly affect, or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 58-62, 64, 65, and 73-85 are pending in the application.[1] Claims 1-48 were originally filed on September 21, 2004. Applicant added new claims 49-51 in Applicant's Response to the Office Action of September 7, 2005. Applicant canceled claims 2 and 35-48, and added new claims 52-65 in response to the Election/Restriction Request dated January 27, 2006. Applicant then canceled claims 7, 15, 49, and 63 in Applicant's Response to the Office Action dated April 18, 2006.

Applicant filed its first Request for Continued Examination on January 22, 2007. Applicant added new claims 66-72 in Applicant's Response to the Office Action dated March 21, 2007. Applicant then canceled claims 1, 3-6, 8-14, 16-34, and 50-57 in Applicant's Response to the Office Action dated July 26, 2007.

Applicant filed a second Request for Continued Examination on October 25, 2007. No claims were canceled or added. Applicant filed a third Request for Continued Examination on September 22, 2008. Applicant canceled claims 66-72 in Applicant's Response to the Advisory Action dated January 12, 2009. Applicant added new claims 73-85 in Applicant's Response to the Office Action dated February 4, 2009.

Consequently, claims 58-62, 64, 65, and 73-85 remain pending. Applicant appeals the rejection of pending dependent claims 60, 61, 64, 65, 77, and 83, which are shown in the Claims Appendix VIII.

[1] In the Office Action dated March 3, 2010, the examiner erroneously states that claims 58-65 and 73-85 are rejected in the Disposition of Claims section. As discussed below, dependent claim 63 was canceled by Applicant in Applicant's Response to the Office Action dated April 18, 2006 so claims 58-62, 64, 65, and 73-85 are pending in this application.

IV. Status of Amendments

Applicant's proposed amendments to claims 58, 64, 65, 73, and 80 and proposed cancellation of claims 78 and 84 in Applicant's Response dated May 3, 2010, were denied entry by the examiner and are not reflected in the appended listing of claims (Claims Appendix VIII). All other claimed amendments have been entered and are reflected in the Claims Appendix VIII.

V. Summary of Claimed Subject Matter

The independent claims are claims 58, 73, and 80. Only dependent claims 60, 61, 64, 65, 77, and 83 are appealed. Claims 60, 61, 64, and 65 depend from independent claim 58; claim 77 depends from independent claim 73; and claim 83 depends from independent claim 80. The subject matter defined in each independent claim relates to an apparatus for traversing traverse a seabed topographic feature.

More particularly, the apparatus recited in independent claim 58 includes a subsea pipeline constructed to carry fluids across the topographic feature between a first location and a second location (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E, and 2I). The topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof (*e.g.*, Paras. [0001], [0007], [0028], and [0042]; Figures 2E and 2I, reference numeral 12). The subsea pipeline can include at least one distributed buoyancy region (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 122 and 162, respectively). The pipeline can further include a first unbuoyed pipeline section extending from said first location on a sea floor to said distributed buoyancy region (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 128 and 164A, respectively) and a second unbuoyed pipeline section extending from said distributed buoyancy region to said second location on a sea floor (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 124 and 164B, respectively). The distributed buoyancy region can include two or more spatially arranged discrete buoyancy solutions directly attached to said distributed buoyancy region to create a positively buoyant inverse catenary section connecting said first and said second pipeline sections in fluid communication when said distributed buoyancy solutions are located below the waterline (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 122 and 162, respectively). The apparatus can further include a flexure control device located between said first unbuoyed pipeline section and said distributed buoyancy region to reduce bending stress and strain in said first unbuoyed pipeline section (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numeral 36).

The subject matter recited in dependent claim 60 describes each discrete buoyancy solution as having a coating of buoyant material (*e.g.*, Paras. [0008], [0029], [0037], [0042], and [0052]; Figures 2E and 2I, reference numerals 122 and 162, respectively).

The subject matter recited in dependent claim 61 describes a tether system to retain the pipeline in position and resist undersea currents (*e.g.*, Paras. [0008], [0031], and [0040]; Originally-filed claim 5).

The subject matter recited in dependent claim 64 describes the flexure control device as being located proximate to an edge of the topographic feature (*e.g.*, Paras. [0008] and [0037]; Figure 2E, reference numerals 12 and 36, respectively).

The subject matter recited in dependent claim 65 describes the flexure control device as being located distant to an edge of the topographic feature (*e.g.*, Paras. [0008] and [0042]; Figure 2I, reference numerals 12 and 36, respectively).

The apparatus recited in independent claim 73 includes a first unbuoyed section located subsea (*e.g.*, Paras. [0008] and [0040]; Figure 2H, reference numeral 154A) and extending from a first location on the seabed (*e.g.*, Paras. [0008] and [0040]; Figure 2H, reference numeral 14), and a second unbuoyed section located subsea (*e.g.*, Paras. [0008] and [0040]; Figure 2H, reference numeral 154B) and extending from a second location on the seabed (*e.g.*, Paras. [0008] and [0040]; Figure 2H, reference numeral 16). The pipeline can further include at least one positively buoyant inverse catenary section disposed between the first and second unbuoyed sections (*e.g.*, Paras. [0008] and [0040]; Figure 2H, reference numeral 152). The positively buoyant inverse catenary section can include two or more spatially arranged buoyancy solutions directly attached to an outer diameter thereof to provide a positively buoyant inverse catenary section when the buoyancy solutions are located below the waterline (*e.g.*, Paras. [0029], [0040], and [0048]; Figure 2H, reference numeral 152), wherein the first and second unbuoyed sections are in fluid communication with one another via the positively buoyant inverse catenary section, (*e.g.*, Para. [0008]), wherein the at least one positively buoyant inverse catenary section traverses the topographic feature (e.g., Paras. [0008] and [0040]; Figure 2H, reference numeral 12), and wherein the topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments, and combinations thereof (*e.g.*, Paras. [0001], [0007], [0028], and [0042]; Figure 2H, reference numeral 12).

The subject matter recited in dependent claim 77 describes the buoyancy solutions as a buoyant coating (*e.g.*, Paras. [0008], [0029], [0037], [0042], and [0052]; Figure 2H, reference numeral 152).

The apparatus recited in independent claim 80 includes a subsea pipeline constructed to carry fluids across the topographic feature between a first location and a second location (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E, and 2I). The topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof (*e.g.*, Paras. [0001], [0007], [0028], and [0042]; Figures 2E and 2I, reference numeral 12). The subsea pipeline can include at least one distributed buoyancy region (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 122 and 162, respectively). The pipeline can further include a first unbuoyed pipeline section extending from said first location on a sea floor to said distributed buoyancy region (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 128 and 164A, respectively) and a second unbuoyed pipeline section extending from said distributed buoyancy region to said second location on a sea floor (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 124 and 164B, respectively). The distributed buoyancy region can include two or more spatially arranged discrete buoyancy solutions directly attached to said distributed buoyancy region to create a self-supporting, positively buoyant, inverse catenary section connecting said first and said second pipeline sections in fluid communication (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numerals 122 and 162, respectively). The apparatus can further include a flexure control device located between said first unbuoyed pipeline section and said distributed buoyancy region to reduce bending stress and strain in said first unbuoyed pipeline section (*e.g.*, Paras. [0008], [0037], and [0042]; Figures 2E and 2I, reference numeral 36).

The subject matter recited in dependent claim 83 describes the buoyancy solutions as a coating of buoyant material (*e.g.*, Paras. [0008], [0029], [0037], [0042], and [0052]; Figures 2E and 2I, reference numerals 122 and 162, respectively).

VI. Grounds for Rejection to be Reviewed on Appeal

The following grounds for rejection are to be reviewed on appeal.

A. The rejection of claims 60, 77, and 83 under 35 U.S.C. § 103(a) as being unpatentable over Richmond *et al.* (U.S. Patent No. 5,582,252; hereafter "*Richmond*") in view of Brown (U.S. Patent No. 3,524,325; hereafter "*Brown*"), and further in view of Moses *et al.* (U.S. Patent No. 5,615,977; hereafter "*Moses*").

B. The rejection of claims 64 and 65 under 35 U.S.C. § 103(a) as being unpatentable over *Richmond* in view of *Brown*, and in further view of *Moses*.

C. The rejection of claim 61 under 35 U.S.C. § 103 as obvious over *Richmond* in view *Brown* and in further view of Wittgenstein (U.S. Patent No. 3,173,271, hereafter "*Wittgenstein*").

D. The rejection of claim 61 under 35 U.S.C. § 112, first paragraph.

VII. Argument

A. The rejection of claims 60, 77, and 83 under 35 U.S.C. § 103(a) in view of *Richmond*, *Brown*, and *Moses* is improper.

Claims 60 and 83 require a coating of buoyant material, and claim 77 requires a buoyant coating. The examiner correctly notes that *Richmond* does not teach, show, or suggest a buoyant coating or a coating of buoyant material. *See* Final Office Action of March 3, 2010, pp. 5-6. The examiner asserts, however, that *Moses* discloses a buoy as a buoyant coating and cites to reference numeral 42 in Figure 3 of *Moses*. *Id.* The examiner then concludes that it would have been obvious to modify Richmond with the buoys taught by Moses as "a design choice," and that "[s]uch modification prevents rupturing." *Id.*

Applicant respectfully disagrees and submits this rejection is improper for at least two reasons. First, the buoy disclosed in *Moses* is not a buoyant coating or a coating of a buoyant material. Second, the examiner has not provided a rational underpinning to support his reasons for obviousness.

1. *Moses* does not teach a buoyant coating or a coating of a buoyant material, as required in claims 60, 77, and 83

The rejection is improper because neither *Richmond* nor *Moses* teaches, shows, or suggests a buoyancy solution that comprises a buoyant coating or a coating of a buoyant material, as required in claims 60, 77, and 83. The plain and ordinary meaning of the term "coating" is "a layer of any substance spread over a surface." *See, e.g., http://dictionary.reference.com/browse/coating.* Yet, the examiner asserts that the buoyancy device 42 shown in Figure 3 of *Moses* is a buoyant coating.

To the contrary, however, *Moses* describes its buoyancy device 42 as "preferably synthetic foam elements or individual buoyancy tanks." Col. 6, ll. 7-10. Synthetic foam elements and individual buoyancy tanks are not coatings. Further, *Moses* is completely devoid of any teaching or suggestion that its buoyancy device 42 ("preferably synthetic foam elements or individual buoyancy tanks") includes a coating or a layer of a substance spread over its surface. Indeed, the buoyancy device 42 of *Moses* is nothing more than a buoyancy solution for the non-buoyant intermediate pipe sections 30 it surrounds. Accordingly, *Moses* does not teach,

show, or suggest a buoyancy solution that comprises a buoyant coating or a coating of a buoyant material.

Since *Richmond* is silent on the issue as acknowledged by the examiner, the combination of *Richmond* and *Moses* cannot teach, show, or suggest a buoyancy solution that comprises a buoyant coating or a coating of a buoyant material, as required in claims 60, 77, and 83. For at least this reason, the rejection is improper and must be withdrawn.

2. There is no rational underpinning to the reasons for obviousness provided by the examiner

The Supreme Court has reiterated that a patent is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 401 (2007). Rejections based on obviousness must be accompanied by an "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *Id.* at 418 (*quoting In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006)). The *KSR* Court stressed that this reasoning must be made "explicit" and detail what would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed invention does. *Id.*

Here, the examiner failed to provide any rational underpinning to the reasons provided for combining *Richmond* with *Moses*. The examiner has merely asserted that it would have been obvious to modify *Richmond* with the buoys taught by *Moses* as "a design choice," and that "[s]uch modification prevents rupturing." The examiner has provided no rational basis, not to mention any evidence, to support his conclusion that a buoyant material, such as a foam substance, could prevent a pipeline from rupturing and provide any other benefit besides buoyancy.

Insofar as the record shows, flexible couplings can prevent a pipeline from rupturing. *Moses* explains that pipeline rupturing is prevented with the use of flexible couplings 32, not the buoyancy devices 42. *See e.g.*, Col. 2, ll. 40-52; Col 5, ll. 7-13. The buoyancy devices 42 are used to "cause the riser to be lifted from the seabed 20 to a level at which the buoyant force applied by the devices reaches equilibrium with the weight of the riser 12." Col. 5, ll. 48-50; *see also* Col. 6, ll. 6-7, 13-25. As such, the combination of *Richmond* and *Moses*, at best, suggests adding flexural couplings 32 to the pipeline of *Richmond* to avoid ruptures.

Such combination, however, does not arrive at the claimed invention. Nevertheless, the examiner has failed to provide any rational underpinning to support the legal conclusion of obviousness. For at least these reasons, withdrawal of the rejection and allowance of the claims 60, 77, and 83 is respectfully requested.

B. The rejection of claims 64 and 65 as obvious over *Richmond* in view of *Brown*, and in further view of *Moses* is improper.

Claims 64 and 65 were finally rejected under 35 U.S.C. § 103(a) as being unpatentable over *Richmond* in view of *Brown*, and further in view of *Moses*. Claims 64 and 65 require that the flexure control device be located either proximate or distant to an edge of a topographic feature. None of the examiner's Office Actions from February 4, 2009, July 21, 2009, November 18, 2010, March 3, 2010, nor May 7, 2010, address claims 64 or 65 on the merits. Instead, the examiner generally rejects claims 64 and 65 in the rejection of base claim 58 without any reference to an edge of a topographic feature as required in dependent claims 64 and 65.

Therefore, the rejection of claims 64 and 65 is improper because the examiner fails to explain the pertinence of each cited reference with his reasons for rejection. The rejection of claims 64 and 65 is also improper because the combination of *Richmond, Brown*, and *Moses* fails to teach, show, or suggest the claimed subject matter of claims 64 and 65, namely a flexure control device that is located either proximate or distant to an edge of a topographic feature.

1. The examiner failed to clearly explain the pertinence of each cited reference in rejecting claims 64 and 65 and also failed to state reasons for rejection

In making a final rejection, the examiner is required to "state all grounds of rejection then considered applicable to the claims in the application, clearly stating the reasons in support thereof." 37 C.F.R. § 1.113(b). Furthermore, the examiner must clearly explain the pertinence of any cited references in rejecting each claim. 37 C.F.R. § 1.104(c)(2).

Claims 64 and 65 were added to Applicant's claim set in Applicant's Response dated February 3, 2006. Since then, not one of the examiner's Office Actions attempted to treat claims 64 or 65 on the merits. Instead, the examiner continuously rejected claims 64 and 65 in a blanket rejection of base claim 58 without mentioning any of the limitations of claims 64 and 65.

Accordingly, the rejection of claims 64 and 65 is improper because the examiner failed to state the grounds for rejecting claims 64 and 65, and to explain the pertinence of any cited reference in rejecting those claims. For at least these reasons, withdrawal of the rejection and allowance of the claims is respectfully requested.

2. The combination of references fails to teach, show, or suggest the elements of claims 64 and 65

Claims 64 and 65 require that the flexure control device be located either proximate or distant to an edge of a topographic feature, where the topographic feature, as identified in base claim 58, is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof. The examiner acknowledges that neither *Richmond* nor *Brown* disclose flexure control devices, as required in the claims. *See* Office Action of March 3, 2010, p. 6. But the examiner asserts that *Moses* discloses the flexure control device that would be positioned proximate or distant the edge of the topographic feature.

The examiner's interpretation of *Moses* is not correct. *Moses* discloses flexure control devices 32 configured to connect intermediate pipe sections 30 along the length of the riser 12 as it ascends from the seabed 20 to a platform 16. Col 4, l. 54 – Col. 5, l. 13; *see also* Figure 1. As illustrated in Figure 1 of *Moses*, none of the flexure control devices 32 are located near any edge of a topographic feature as identified in Applicant's base claim 58, from which claims 64 and 65 depend. Moreover, while the seabed 22 depicted in Figure 6 of *Brown* (as cited by the Examiner) may undulate, there is no perceivable edge of a subsea basin, dome, valley, cliff, canyon, escarpment, or combinations thereof, as required in the claims.

Accordingly, none of the cited references, alone or in any combination, teach, show, or suggest a flexure control device located either proximate or distant to an edge of a topographic feature, as required in claims 64 and 65. For at least this reason, the rejection must be withdrawn and claims 64 and 65 are in condition for allowance.

C. The rejection of claim 61 under 35 U.S.C. § 103 as obvious over *Richmond* in view of *Brown* and in further view of *Wittgenstein* is improper because the examiner's proposed modification of *Richmond* in view of *Wittgenstein* would render *Richmond* unsatisfactory for its intended purpose

The examiner rejected claim 61 under 35 U.S.C. § 103 as unpatentable over *Richmond* in view of *Brown* and in further view of *Wittgenstein*. The examiner asserts that it would have been considered obvious to "modify (the above modified Richmond et al. to include a tether system as taught by Wittgenstein since such a modification would yield predictable results like retain the pipeline in a desired position." *See*, Office Action dated March 3, 2010, p. 7.

Such rejection and grounds for rejection are improper under 35 U.S.C. § 103. When a proposed modification changes the principle of operation and/or requires a substantial reconstruction and redesign of the elements shown in the primary reference, the teachings of the references are not sufficient to render the claims *prima facie* obvious. *See, e.g.*, MPEP 2143.01 (VI). Furthermore, the proposed modification cannot render the prior art unsatisfactory for its intended purpose. *Id. citing In re Gordon*, 733 F.2d 900 (Fed. Cir. 1984). If the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *Id.* Indeed, the examiner's proposed modification of *Richmond*, according to *Wittgenstein* changes the principle of operation of *Richmond* and renders *Richmond* unsuitable for its intended purpose.

As noted above, the examiner bases the rejection on grounds that it would have been obvious to modify *Richmond* with the tether system as taught by *Wittgenstein* since "such a modification would... retain the pipeline in a desired position." In stark contrast, however, the pipeline disclosed in *Richmond* (*e.g.*, riser 22) is not meant to be retained in a fixed position, but is required to be readily moved from one position to another for transporting hydrocarbon fluids from offshore locations to receiving stations, such as oil tankers. *See e.g., Richmond* Abstract and Col. 1, ll. 4-6. The offshore location disclosed in *Richmond* is a platform 1 having a flowline 9 extending therefrom and coupled to a riser 22. Col. 3, l. 44 – Col. 4, l. 13. To retrieve hydrocarbons from the platform 1, a tanker 11 is positioned at the waterline above the riser 22, captures the riser 22 via a marker buoy 31, and lifts the riser 22 from its buoyant position on the seabed 15 to be connected to the tanker 11. Col. 4, ll. 55-66. After the desired amount of hydrocarbons is pumped into the tanker 11, the riser 22 is then lowered back down to the seabed 15. *Id.*

In opposite, *Wittgenstein* discloses a tethering system for maintaining an underwater pipeline 1 stationary by attaching a series of anchor weights B_n to the pipeline 1. Col. 1, ll. 23-34; Col. 4, ll. 16-21. So that the anchor weights B_n provide a strong mooring system, the anchor weights B_n are immersed into the seabed 3 and further "reinforced with small bars which easily sink into a muddy bed (3)." Col. 1, l. 26; Col. 4, ll. 54-55.

Therefore, one of ordinary skill in the art would not have been motivated to modify the moveable system of *Richmond* with the stationary system of *Wittgenstein* because the anchor weights B_n from *Wittgenstein* would prevent the riser 22 in *Richmond* from being readily and easily moved between the seabed and a floating tanker, defeating its intended purpose. Because such a modification would change *Richmond's* principal of operation and defeat its intended purpose, the rejection under 35 U.S.C. § 103 is improper and must be withdrawn.

D. The rejection of claim 61 under 35 U.S.C. § 112, first paragraph, is improper because the tether system is not new matter

The examiner rejected claim 61 under 35 U.S.C. § 112, first paragraph, on grounds that the claimed tether system was not described in the specification in such a way as to reasonably convey to one skilled in the art that Applicant had possession of the claimed invention at the time the invention was filed. *See* Office Action of March 3, 2010, p. 2. Contrary to the examiner's assertion, the tether system recited in new claim 61 is more than sufficiently described in the specification and/or claims, as originally filed, to reasonably convey to one skilled in the art that Applicant had possession of the claimed invention at the time the invention was filed.

Indeed, subject matter that was disclosed in the original specification and/or claims is not considered new matter. MPEP 608.04(a). Original claim 5 recited "a tether system to retain said pipeline in position and to resist forces of undersea currents." Similarly, paragraphs [0008], [0031], and [0040] of the application, as originally filed, each explicitly disclosed a tether system and described its basic function. More particularly, paragraph [0008] states that "the pipeline can include a tether system to retain the pipeline in place and to resist undersea currents;" paragraph [0031] stated that "[s]uch tethers can be installed and secured using methods and apparatuses well known to one skilled in the art;" and paragraph [0040] stated that "[t]o prevent pipeline 18 from being displaced significantly by environmental forces, tethers (not shown) or other mooring systems can be used."

For any of these reasons, the tether system recited in new claim 61 is more than sufficiently described in the specification and/or claims, as originally filed, to reasonably convey to one skilled in the art that Applicant had possession of the claimed invention at the time the invention was filed. Therefore, the examiner erred in concluding that the tether system of claim 61 had no basis in the originally filed disclosure. Withdrawal of the rejection and allowance of claim 61 is respectfully requested.

E. CONCLUSION

For the foregoing reasons, claims 60, 61, 64, 65, 77, and 83 are patentable over the cited references. Withdrawal of the rejections and allowance of the claims is respectfully requested.

Respectfully submitted,

August 3, 2010
Date

Robb D. Edmonds
Attorney for Applicant
Registration No. 46,681

Please mail correspondence to the address associated with **customer number 32583.**

Christian Heausler
IP Legal Department
Kellogg Brown & Root LLC
4100 Clinton Drive
Houston, Texas 77020

VIII. Claims Appendix

Claims 1-57 (Canceled).

58) (Previously Presented) An apparatus to traverse a seabed topographic feature, comprising:

a subsea pipeline constructed to carry fluids across the topographic feature between a first location and a second location; wherein:

the topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof;

said pipeline comprising at least one distributed buoyancy region;

said pipeline comprising a first unbuoyed pipeline section extending from said first location on a sea floor to said distributed buoyancy region and a second unbuoyed pipeline section extending from said distributed buoyancy region to said second location on a sea floor; and

said distributed buoyancy region comprising two or more spatially arranged discrete buoyancy solutions directly attached to said distributed buoyancy region to create a positively buoyant inverse catenary section connecting said first and said second pipeline sections in fluid communication when said distributed buoyancy solutions are located below the waterline; and

a flexure control device located between said first unbuoyed pipeline section and said distributed buoyancy region to reduce bending stress and strain in said first unbuoyed pipeline section.

59) (Previously Presented) The apparatus of claim 58 wherein each discrete buoyancy solution comprises one or more buoyancy-providing modules disposed along a length of said pipeline.

60) (Previously Presented) The apparatus of claim 58 wherein each discrete buoyancy solution comprises a coating of buoyant material.

61) (Previously Presented) The apparatus of claim 58 further comprising a tether system to retain said pipeline in position and to resist forces of undersea currents.

62) (Previously Presented) The apparatus of claim 58 wherein said first and said second pipeline sections are negatively buoyant.

63) (Canceled)

64) (Previously Presented) The apparatus of claim 58 wherein the flexure control device is located proximate to an edge of the topographic feature.

65) (Previously Presented) The apparatus of claim 58 wherein the flexure control device is located distant to an edge of the topographic feature.

Claims 66-72 (Canceled).

73) (Previously Presented) A pipeline for traversing a topographic feature, comprising:
a first unbuoyed section located subsea and extending from a first location on the seabed;
a second unbuoyed section located subsea and extending from a second location on the seabed; and
at least one positively buoyant inverse catenary section disposed between the first and second unbuoyed sections, wherein the positively buoyant inverse catenary section comprises two or more spatially arranged buoyancy solutions directly attached to an outer diameter thereof to provide a positively buoyant inverse catenary section when the buoyancy solutions are located below the waterline, wherein the first and second unbuoyed sections are in fluid communication with one another via the positively buoyant inverse catenary section, wherein the at least one positively buoyant inverse catenary section traverses the topographic feature, and wherein the topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments, and combinations thereof.

74) (Previously Presented) The pipeline of claim 73, wherein at least one buoyancy solution comprises one or more discrete buoyancy-providing modules.

75) (Previously Presented) The pipeline of claim 74, wherein the buoyancy-providing module is a buoy.

76) (Previously Presented) The pipeline of claim 74, wherein the buoyancy-providing module is a tethered buoy.

77) (Previously Presented) The pipeline of claim 73, wherein at least one buoyancy solution is a buoyant coating.

78) (Previously Presented) The pipeline of claim 73, wherein the first and second locations are located on opposing sides of the topographic feature on the seabed.

79) (Previously Presented) The pipeline of claim 74, wherein the discrete buoyancy-providing module comprises a buoyant coating, buoy, or both.

80) (Previously Presented) An apparatus to traverse a seabed topographic feature, comprising:

a subsea pipeline constructed to carry fluids across the topographic feature between a first location and a second location; wherein:

the topographic feature is selected from the group consisting of subsea basins, domes, valleys, cliffs, canyons, escarpments and combinations thereof;

said pipeline comprising at least one distributed buoyancy region;

said pipeline comprising a first unbuoyed pipeline section extending from said first location on a sea floor to said distributed buoyancy region and a second unbuoyed pipeline section extending from said distributed buoyancy region to said second location on a sea floor; and

said distributed buoyancy region comprising two or more spatially arranged discrete buoyancy solutions directly attached to said distributed buoyancy region to create a self-supporting, positively buoyant, inverse catenary section connecting said first and said second pipeline sections in fluid communication; and

a flexure control device located between said first unbuoyed pipeline section and said distributed buoyancy region to reduce bending stress and strain in said first unbuoyed pipeline section.

81) (Previously Presented) The apparatus of claim 80 wherein at least one buoyancy solution comprises a buoyancy-providing module disposed along a length of said distributed buoyancy region.

82) (Previously Presented) The apparatus of claim 81 wherein the buoyancy-providing module is a tethered buoy.

83) (Previously Presented) The apparatus of claim 80 wherein the buoyancy solutions comprise a coating of buoyant material.

84) (Previously Presented) The apparatus of claim 80 further comprising a flexure control device located between said second unbuoyed pipeline section and said distributed buoyancy region to reduce bending stress and strain in said second unbuoyed pipeline section.

85) (Previously Presented) The apparatus of claim 80 wherein said first and said second pipeline sections are negatively buoyant.

IX. Evidence Appendix

None.

X. Related Proceedings Appendix

None.